



DEPARTMENT OF ENERGY

10 CFR Part 430

[EERE-2018-BT-PET-0017]

RIN 1904-AE37

Energy Conservation Program: Test Procedures for Consumer Warm Air Furnaces; Final Denial of Petition for Rulemaking

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Final denial of petition for rulemaking.

SUMMARY: This document announces and provides the reasoning for the U.S. Department of Energy's final denial of a petition filed by the Air-Conditioning, Heating, and Refrigeration Institute requesting that DOE initiate a notice-and-comment rulemaking to develop a new combined test procedure for consumer furnaces and furnace fans, which would replace the two currently required performance metrics for furnaces and the one performance metric for furnace fans with a single new metric called "AFUE2."

DATES: This final denial of petition for rulemaking is applicable [INSERT DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].

ADDRESSES: The petition and comments filed in accordance with the timelines set forth in the prior *Federal Register* notice have been entered into docket number EERE-2018-BT-PET-0017. The docket is available for review at www.regulations.gov. For further information on how to review the docket, contact the Appliance and Equipment Standards Program staff at (202) 287-1445 or by e-mail: ApplianceStandardsQuestions@ee.doe.gov.

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I. Summary of Final Denial of Petition for Rulemaking

This document denies a petition received by the U.S. Department of Energy ("DOE") from the Air-Conditioning, Heating, and Refrigeration Institute ("AHRI") requesting that DOE initiate a rulemaking to develop a new combined test procedure addressing covered consumer furnaces and furnace fans, which would replace the two currently required performance metrics for furnaces (*i.e.*, annual fuel utilization efficiency ("AFUE") and standby mode/off mode energy consumption (PW_{SB} / PW_{OFF})) and the one performance metric for furnace fans (*i.e.*, fan efficiency ratio ("FER")) with a single new metric called "AFUE2." AHRI asserted that a single performance metric would reduce regulatory burden for furnace manufacturers by streamlining test requirements and aligning regulatory review schedules and promote design flexibility and product innovation.

DOE has determined that a combined test procedure and energy conservation standard for consumer furnaces and furnace fans would enable an increase in the maximum allowable energy use and/or minimum required efficiency of furnaces and furnace fans, each a separate covered product. AHRI's suggested unified metric would allow for trade-offs in energy use between the two separately regulated modes of furnace operation (*i.e.*, active mode and standby mode/off

mode) and furnaces fans. These tradeoffs in turn have the potential to allow for furnaces to consume more energy in active mode or standby mode/off mode than permitted under the active mode and standby/off mode standards, or for furnace fans to consume more energy than permitted under the current furnace fan standard. This is impermissible under the “anti-backsliding” provision of the Energy Policy and Conservation Act, as amended (“EPCA”)¹, which prevents the Secretary from prescribing any amended standard that either increases the maximum allowable energy use or decreases the minimum required energy efficiency of a covered product. (42 U.S.C. 6295(o)(1)) DOE has also determined that a unified metric for consumer furnaces and furnace fans (using the proposed combined metric AFUE2) would be contrary to DOE’s prior determination that it is technologically infeasible to integrate active mode and standby or off mode energy use for furnaces.

Therefore, after carefully considering AHRI’s request, supporting materials accompanying the request, and submitted comments, DOE is declining to grant AHRI’s request for the reasons set forth in the following discussion.

II. Background and Authority

EPCA, as amended, among of things, authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. (42 U.S.C. 6291–6317) Title III, Part B² of EPCA established the Energy Conservation Program for Consumer Products Other Than Automobiles, which sets forth a variety of provisions designed to improve energy efficiency for certain types of consumer products. These products include consumer furnaces and furnace fans, the focus of this document. (42 U.S.C. 6292(a)(5); 42 U.S.C. 6295(f)(4)(D))

Under EPCA, DOE’s energy conservation program consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA specifically include definitions (42

¹ All references to EPCA in this document refer to the statute as amended through the Energy Act of 2020, Pub. L. 116-260 (Dec. 27, 2020).

² For editorial reasons, upon codification in the U.S. Code, Part B was redesignated as Part A.

U.S.C. 6291), test procedures (42 U.S.C. 6293), labeling provisions (42 U.S.C. 6294), energy conservation standards (42 U.S.C. 6295), and the authority to require information and reports from manufacturers (42 U.S.C. 6296).

The Federal testing requirements consist of test procedures that manufacturers of covered products must use as the basis for: (1) certifying to DOE that their products comply with the applicable energy conservation standards adopted pursuant to EPCA (42 U.S.C. 6295(s)), and (2) making representations about the efficiency of that product (42 U.S.C. 6293(c)). Similarly, DOE must use these test procedures to determine whether the product complies with relevant standards promulgated under EPCA. (42 U.S.C. 6295(s))

Under 42 U.S.C. 6293, EPCA sets forth the criteria and procedures DOE is required to follow when prescribing or amending test procedures for covered products. Specifically, EPCA requires that any test procedures prescribed or amended must be reasonably designed to produce test results which measure energy efficiency, energy use, or estimated annual operating cost of a covered product during a representative average use cycle or period of use and requires that test procedures not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3)) The test procedures for consumer furnaces and furnace fans are set forth in the Code of Federal Regulations (“CFR”) at 10 CFR part 430. More specifically, the test procedure for furnaces is located at 10 CFR part 430, subpart B, appendix N (“Appendix N”), *Uniform Test Method for Measuring the Energy Consumption of Furnaces and Boilers*. The test procedure for furnace fans is located at 10 CFR part 430, subpart B, appendix AA (“Appendix AA”), *Uniform Test Method for Measuring the Energy Consumption of Furnaces Fans*.

Relevant to this document, EPCA also requires DOE to follow specific statutory criteria for prescribing new or amended standards for covered products, including consumer furnaces and furnace fans. Any new or amended standard for a covered product must be designed to achieve the maximum improvement in energy efficiency that the Secretary of Energy determines is technologically feasible and economically justified. (42 U.S.C. 6295(o)(2)(A) and 42 U.S.C.

6295(o)(3)(B)) EPCA also contains what is known as an “anti-backsliding” provision, which prevents the Secretary from prescribing any amended standard that either increases the maximum allowable energy use or decreases the minimum required energy efficiency of a covered product. (42 U.S.C. 6295(o)(1))

Additionally, pursuant to the amendments to EPCA contained in the Energy Independence and Security Act of 2007 (“EISA 2007”), Pub. L. 110-140, any final rule for new or amended energy conservation standards promulgated after July 1, 2010, is required to address standby mode and off mode energy use. (42 U.S.C. 6295(gg)(3)) Specifically, when DOE adopts a standard for a covered product after that date, it must, if justified by the criteria for adoption of standards under EPCA (42 U.S.C. 6295(o)), incorporate standby mode and off mode energy use into a single standard, or, if that is not feasible, adopt a separate standard for such energy use for that product. (42 U.S.C. 6295(gg)(3)(A)-(B))

DOE has established energy conservation standards for furnace energy efficiency using the AFUE metric, which is the ratio of annual output energy to annual input energy. 10 CFR 430.32(e)(1)(ii). DOE also separately established energy conservation standards for furnace standby mode and off mode electrical power consumption, $P_{W,SB}$ and $P_{W,OFF}$, respectively, which account for all furnace electrical consumption in standby and off modes. 10 CFR 430.32(e)(1)(iii). DOE has established an energy conservation standard for furnace fans using the FER metric, which is the ratio of the electrical energy consumption to airflow in watts per cubic feet per minute (CFM). 10 CFR 430.32(y). The FER metric measures performance during active mode when the fan is circulating air, but it does not include provisions for measuring standby mode and off mode energy consumption of furnace fans (although appendix AA includes a section reserved for future provisions to address standby mode and off mode energy use, if necessary). Instead, the standby mode and off mode energy consumption for furnace fans is addressed by the test procedures and metrics for consumer furnaces and residential central air

conditioners and heat pumps, as these products operate in conjunction with furnace fans. *See* 78 FR 19606, 19619 (April 2, 2013).

The Administrative Procedure Act (APA), 5 U.S.C. 551 *et seq.*, provides among other things, that “[e]ach agency shall give an interested person the right to petition for the issuance, amendment, or repeal of a rule.” (5 U.S.C. 553(e))

III. AHRI’s Petition for Rulemaking Summary and Comments

On October 12, 2018, DOE received a petition from AHRI (“AHRI Petition”) asking DOE to initiate notice-and-comment rulemaking to develop a new test procedure for residential furnaces and furnace fans which would replace the two currently required performance metrics for furnaces (*i.e.*, AFUE and PW_{SB} / PW_{OFF}) and the one performance metric for furnace fans (*i.e.*, FER) with a single new metric (*i.e.*, AFUE2).³ On November 14, 2018, DOE published a Notice of Petition for Rulemaking (“2018 Notice of Petition for Rulemaking”) announcing the receipt of the AHRI Petition and inviting interested parties to submit comments. 83 FR 56746.

In the petition, AHRI suggested AFUE2 metric would account for furnace fuel, fan power, and standby mode and off mode power consumption, and the measured value would represent the sum of usable heat and fan benefit, divided by the total fuel and electricity consumed. (AHRI, No. 2 at p. 2)⁴ AHRI asserted that transitioning to a single metric, such as AFUE2, would reduce regulatory burden on manufacturers by streamlining test requirements and aligning regulatory review schedules, thereby promoting design flexibility and product innovation. (AHRI, No. 2 at pp. 4-5) The petitioner further asserted that consumers would also benefit by having a single, combined metric for product comparison purposes and by receiving some portion of anticipated cost savings, all of which could be achieved without sacrificing energy savings. (AHRI, No. 2 at pp. 5-6) The petition acknowledges that a combined metric

³ The AHRI Petition is available in the docket at www.regulations.gov/docket?D=EERE-2018-BT-PET-0017-0002. The petition did not identify any of the information contained therein as confidential business information.

⁴ The parenthetical reference provides a reference for information located in the docket for the petition for rulemaking. (Docket No. EERE-2018-BT-PET-0017, which is maintained at www.regulations.gov). The references are arranged as follows: (commenter name, comment docket ID number, page of that document).

would necessitate a translation of the existing energy conservation standards applicable to residential furnaces and furnace fans. (AHRI, No. 2 at pp. 6-7) Additionally, in a separate letter to DOE dated November 2, 2018, AHRI requested that DOE not enforce the reporting, certification and compliance obligations related to the furnace fan energy conservation standards pending consideration of their petition for rulemaking.⁵ (AHRI, No. 3 at pp. 1-2)

In the 2018 Notice of Petition for Rulemaking, DOE invited interested parties to submit comments regarding the petition. 83 FR 56746, 56746 (Nov. 14, 2018). DOE received comments in response to the 2018 Notification of Petition for Rulemaking from the interested parties listed in Table II-1.⁶ In the following discussion, DOE addresses the relevant comments.

⁵ On November 2, 2018, DOE issued an enforcement policy stating that it would not enforce the testing, certification, and standards requirements for furnace fans while DOE considered the 2018 Petition for Rulemaking. In response to the policy statement DOE received comments from a wide variety of parties as well as a letter from AHRI requesting that DOE rescind the enforcement policy. On February 11, 2019, DOE rescinded the November 2, 2018 policy statement. The request that DOE not enforce the furnace fan energy conservation pending consideration of the petition for rulemaking is not considered further in this document. The policy statement and rescission are available at www.energy.gov/gc/downloads/furnace-fan-enforcement-policy.

⁶ Stakeholders' comments can be accessed in the docket at www.regulations.gov/docket/EERE-2018-BT-PET-0017. DOE also received several non-substantive comments or comments not relevant to the petition, which are not included in the table.

Table II-1 Written Comments Received in Response to 2018 Notification of Petition for Rulemaking

Commenter(s)	Abbreviation	Commenter Type
Air-Conditioning Heating, and Refrigeration Institute	AHRI	Trade Association
Alliance to Save Energy	ASE	Efficiency Organizations
Appliance Standards Awareness Project, American Council for an Energy-Efficient Economy, and Natural Resources Defense Council	Joint Commenters	Efficiency Organizations
California Energy Commission	CEC	State Agency
Carrier Corporation	Carrier	Manufacturer
Connecticut Department of Energy and Environmental Protection	CT DEEP	State Agency
Consumer Federation of America and National Consumer Law Center	Consumer Groups	Consumer Organizations
Earthjustice and the Sierra Club	Earthjustice and the Sierra Club	Efficiency Organizations
Ingersoll Rand	Ingersoll Rand	Manufacturer
Lennox International	Lennox	Manufacturer
Lochinvar/A.O. Smith Corporation	A.O. Smith	Manufacturer
National Electric Manufacturers Association	NEMA	Trade Association
National Grid	National Grid	Utilities
Natural Resources Defense Council	NRDC	Efficiency Organizations
New York State Energy Research and Development Authority	NYSERDA	State Agency
Northeast Energy Efficiency Partnership	NEEP	Efficiency Organizations
Northwest Energy Efficiency Alliance	NEEA	Efficiency Organizations
Northwest Power and Conservation Council	NPCC	Utilities
Pacific Gas and Electric, Southern California Edison, and San Diego Gas and Electric (collectively the California Investor-Owned Utilities)	CA IOUs	Utilities
Plumbing-Heating-Cooling Contractors	PHCC	Trade Association
Regal Beloit America, Inc.	Regal Beloit	Manufacturer
Rheem Manufacturing Company	Rheem	Manufacturer

In general overview, furnace manufacturers supported the AHRI petition, stating that a combined metric would lead to benefits for both manufacturers and/or consumers. (Lennox, No. 34 at pp. 1-5; Carrier, No. 33 at pp. 1, 3-4; Rheem, No. 45 at pp. 1-2; Ingersoll Rand, No. 43 at p. 1) More specifically, manufacturers referenced the fact that there are currently three different energy conservation standards (and three different test procedures) related to consumer furnace efficiency (*i.e.*, AFUE, FER, and standby mode/off mode power consumption) and that each of these regulations is subject to separate regulatory review schedules. (Lennox, No. 34 at pp. 3-4;

Rheem, No. 45 at pp. 1-2) Lennox further stated that having so many separate regulatory schedules places manufacturers, distributors, contractors, and DOE in a constant state of change and adjustment. Lennox stated that every time DOE amends standards, manufacturers must redesign equipment, make capital investments to update manufacturing facilities, republish marketing literature, and educate distributors, contractors, and consumers about the changes. Lennox also asserted that the costs associated with these activities are ultimately passed on to consumers. (Lennox, No. 34 at pp. 3-5) Manufacturers stated that adopting the AFUE2 metric, consolidating certification and testing requirements, and streamlining rulemaking and redesign cycles could allow for more effective utilization of manufacturer resources by reducing this regulatory burden. (Lennox, No. 34 at pp. 3-4; Carrier, No. 33 at p. 3; Rheem, No. 45 at p. 1; Ingersoll Rand, No. 43 at p. 1)

Manufacturers also generally asserted that the simplified ratings could reduce design constraints or otherwise increase opportunities for innovation. (Carrier, No. 33 at p. 3; Rheem, No. 45 at p. 2; Ingersoll Rand, No. 43 at p. 1) Lennox suggested that setting requirements for individual furnace components restricts design choices between various aspects of a residential furnace. Lennox stated that the AFUE2 test method would promote innovation by enabling manufacturers to develop the most effective solution for overall product efficiency at the lowest cost. (Lennox, No. 34 at p. 5) In its petition, AHRI estimated that the total reduction in regulatory burden resulting from implementation of AFUE2 would save manufacturers more than \$250 million over thirty years. (AHRI, No. 2 at p. 4)⁷

Manufacturers also stated that a combined metric would make it easier for consumers to compare the overall efficiencies of furnace models. (Carrier, No. 33 at pp. 3-4; Lennox, No. 34 at pp. 3, 4) More specifically, Lennox suggested that consumers (and selling contractors) often do not understand that the energy consumption associated with the FER metric generally is less

⁷ AHRI's calculations of burden reduction are included in Exhibit 3, which was submitted with the original petition and can be found at www.regulations.gov/document/EERE-2018-BT-PET-0017-0002.

than 5 percent of the total energy consumed in the operation of a product, or that standby mode represents a miniscule amount of energy use compared to the amount of energy used to create heat via combustion. (Lennox, No. 34 at p. 3)

Lennox also commented that the AFUE2 metric would also have the benefit of reducing the need for government intervention and saving government resources by reducing the quantity of regulations. (Lennox, No. 34 at pp. 2, 5) Finally, several furnace manufacturers commented that although a crosswalk has not yet been completed, further work in this area should continue and suggested that revised energy efficiency standards (in terms of AFUE2) could reflect the overall system energy efficiency already required by the AFUE, PW_{SB} and PW_{OFF} , and FER metrics. (Ingersoll Rand, No. 43 at p. 1; Rheem, No. 45 at p. 2; Lennox, No. 34 at pp. 2, 4)

In contrast, efficiency organizations, State agencies, and utilities generally opposed the petition, asserting that the combined metric would obscure the efficiencies of separately regulated elements (which often use different energy sources) and could potentially lead to backsliding. These commenters also asserted that a combined metric could reduce the amount of future energy savings potential. (NEEA, No. 35 at pp. 1, 4; Joint Commenters, No. 42 at pp. 1-3; CEC, No. 38 at pp. 1-6; Earthjustice and the Sierra Club, No. 31 at pp. 1, 3-4; NRDC, No. 39 at pp. 1, 4-5; NYSERDA, No. 30 at pp. 1-2; CA IOUs, No. 27 at pp. 1-4; NEEP, No. 36 at p. 1; CT DEEP, No. 46 at p. 1; NEMA, No. 26 at pp. 5-8)

Consumer Groups stated that AHRI's petition relies on the assumption that a crosswalk can be generated to translate the three current standards to a single standard that relies on AFUE2 without: (a) diminishing the energy savings that would otherwise be achieved, (b) harming consumers, or (c) violating EPCA. These commenters stated that it is unproven that such a crosswalk is possible and further argued that such approach would not be permissible under EPCA. (Consumer Groups, No. 31 at pp. 2-4)

The Joint Commenters stated that AHRI's requested change to the test procedures (and subsequent changes to the energy conservation standards), if adopted by DOE, would violate the

specific directive from EPCA that requires DOE to set air circulation efficiency standards; illegally combine the required air circulation standard with a standards based on fuel use; improperly apply the EPCA provision regarding adjustment to standards based on test procedure changes to an amendment merging standards;⁸ and adopt an approach for standby mode and off mode power consumption that DOE has previously found is not technically feasible. (Joint Commenters, No. 42 at p. 7) Earthjustice and the Sierra Club and NRDC similarly stated that DOE does not have authority under EPCA to crosswalk and combine multiple metrics into a single combined metric, or the authority to combine the standby mode and off mode power consumption metrics with active mode energy consumption for furnaces. (Earthjustice and the Sierra Club, No. 41 at pp. 4-6; NRDC, No. 39 at pp. 3-6) Earthjustice and the Sierra Club also stated that DOE does not have authority under EPCA to combine the electrical energy consumption of furnace fans into the fuel efficiency standards for furnaces. (Earthjustice and the Sierra Club, No. 41 at pp. 2-3) Consumer Groups stated that AHRI's position that 42 U.S.C. 6293(e) provides the authority for DOE to develop an AFUE2 standard to replace the three current standards is in error because AHRI is not proposing to amend an existing test procedure (which is what 42 USC 6293(e) addresses), but rather to eliminate existing test procedures and replace them with an entirely new test procedure and associated standards. (Consumer Groups, No. 31 at p. 6)

Multiple commenters also asserted that under the combined metric, less-efficient furnace fans could be used and that this would reduce the potential for future energy savings or enable the use of less-efficient furnace fans than are currently allowed. (NEEP, No. 36 at p. 1; CEC, No. 38 at pp. 3-4; CT DEEP, No. 46 at p. 1; NYSERDA, No. 30 at pp. 1-2; National Grid, No.

⁸ DOE understands the Joint Commenters to be referencing 42 U.S.C. 6293(e), which provides that in the case of any amended test procedure, the Secretary shall determine to what extent, if any, the proposed test procedure would alter the measured energy efficiency, measured energy use, or measured water use of any covered product as determined under the existing test procedure and that if the Secretary determines that the amended test procedure will alter the measured efficiency or measured use, the Secretary shall amend the applicable energy conservation standard as prescribed by certain provisions specified in 42 U.S.C. 6293(e) during the rulemaking carried out with respect to such test procedure.

28 at p. 1; CA IOUs, No. 27 at pp. 1-4; NEMA, No. 26 at pp. 5-8; Regal Beloit, No. 25 at pp. 3-4; NPCC, No. 29 at p. 2; Joint Commenters, No. 42 at pp. 2-3, 7; Earthjustice and the Sierra Club, No. 41 at pp. 3-4)

Regal Beloit commented that the AFUE2 test procedure could potentially result in an increase in the maximum allowable energy use from furnace fans because the AFUE2 test procedure would change certain definitions and/or values of certain variables that could lead to an increase in the maximum allowable energy use of furnace fans. (Regal Beloit, No. 25 at p. 4) NEEP and CT DEEP commented that combining efficiency standards could present new challenges for energy efficiency efforts that use Federal standards in their calculations. (NEEP, No. 36 at p. 1; CT DEEP, No. 46 at p. 1)

PHCC supported the effort to consolidate metrics and streamline the regulatory process (which it asserted would lead to reduced costs for consumers), but also expressed concerns that the proposal should undergo further review to ensure that no backsliding could occur. (PHCC, No. 32 at pp. 1-2) NEMA supported the initiative to reduce regulatory burden by consolidating the three existing test procedures into a single metric for furnaces, but expressed concerns that the proposal outlined in the AHRI Petition would not comply with statutory requirements set forth in EPCA (specifically referencing the anti-backsliding provision at 42 U.S.C. 6295(o)(1)). NEMA encouraged DOE to deny AHRI's petition but encouraged AHRI to reformulate its proposed metric to ensure compliance with EPCA. (NEMA, No. 26 at pp. 2-8)

Several commenters expressed concern that the AFUE2 metric could confuse, mislead, or otherwise negatively impact consumers by masking the operating costs of different elements and products (with different energy sources), or lead to increased consumer costs. (NEEA, No. 35 at pp. 1-4; Joint Commenters, No. 42 at pp. 1, 4, 8; NRDC, No. 39 at pp. 2, 8; NYSERDA, No. 30 at pp. 1-2; National Grid, No. 28 at p. 1; CA IOUs, No. 27 at pp. 1, 5-6; Consumer Groups, No. 31 at p. 3; Regal Beloit, No. 25 at pp. 4-5) Similarly, ASE commented that the use of site-energy equivalents (rather than primary energy or average energy costs) to combine electricity and

natural gas consumption into a single metric could lead to backsliding and could significantly misrepresent the relative energy operating costs to homeowners and consumers. (ASE, No. 40 at p. 2) NYSERDA stated that AFUE2 would incentivize manufacturers to optimize their designs to reduce site energy use, rather than consumer costs or total energy use. (NYSERDA, No. 30 at p. 2) National Grid and the CA IOUs stated that combining fuel sources into one metric creates confusion for utilities when estimating fuel savings associated with different products, which could make it difficult to develop incentive programs. (National Grid, No. 28 at p. 1; CA IOUs, No. 27 at pp. 1, 5-6) The CA IOUs suggested that a shift to AFUE2 would result in higher peak loads for electric utilities (which these commenters argued could in turn lead to higher utility bills for customers) because the saturation of efficient furnace fans and low standby loss units will decrease (as fan/electrical efficiency has a very limited impact on AFUE2 ratings). (CA IOUs, No. 27 at pp. 7-8) Regal Beloit added that maintaining the FER metric would protect consumer choice by driving the use of high-efficiency motors in all furnace types. (Regal Beloit, No. 25 at p. 4)

Regarding manufacturer burden, the Joint Commenters suggested that moving forward with the AFUE2 metric could undermine regulatory predictability because it would strand the investments that furnace fan component manufacturers and furnace manufacturers have already made towards FER compliance. (Joint Commenters, No. 42 at pp. 6-7) NEEP asserted that the AFUE2 petition and enforcement policy would create regulatory uncertainty and undue hardship for motor manufacturers, retailers, distributors, and customers who are unclear about which furnaces will be compliant with the new standards. (NEEP, No. 36 at p. 1) NEEA and the Joint Commenters also suggested that AHRI's proposal would be damaging to manufacturers and their component and assembly suppliers, who have already invested in the design and production of products that meet the most recent efficiency standards. (NEEA, No. 35 at p. 3; Joint Commenters, No. 42 at pp. 2, 6-7) The CA IOUs also commented that there is no need for "trade-offs" between furnace fan and furnace efficiency, asserting that DOE has shown

efficiency improvements to each rating to be cost-effective on their own. (CA IOUs, No. 27 at p. 7)

Consumer Groups remarked that while reductions in regulatory burden in the abstract are desirable, nothing in EPCA establishes “reducing regulatory burden” as a statutory goal, and according to these commenters, the contents of the AHRI petition violate explicit provisions of that statutory scheme. Specifically, the Consumer Groups provided several citations, which they argue require DOE to adopt and enforce standards for furnaces, including 42 U.S.C. 6291(23) (defining “furnace”), 42 U.S.C. 6291(22) (setting “annual fuel utilization efficiency” as the “efficiency descriptor” for “furnaces”), 42 U.S.C. 6295(f)(1) (setting initial AFUE standards for furnaces), 42 U.S.C. 6295(f)(4)(D) (directing DOE to set standards for furnace fans), and 42 U.S.C. 6295(gg) (directing DOE to set standards for furnace standby mode and off mode energy use). (Consumer Groups, No. 31 at pp. 2-4)

NEEA disagreed with AHRI’s claim that innovation would increase as a result of adoption the AFUE2 metric and suggested that innovation would actually decrease because manufacturers often improve product features unrelated to efficiency at the same time that they redesign products to meet new energy efficiency requirements. (NEEA, No. 35 at p. 2)

Similarly, the Joint Commenters commented that AFUE2 would allow manufacturers to avoid innovating air movement designs and suggested that increases in standards drive innovation. (Joint Commenters, No. 42 at p. 9)

The Joint Commenters argued that AHRI’s claim of manufacturer cost savings is overstated and appears to result from the assumption that furnace fan and standby mode and off mode efficiency improvements would not be required, which the commenters argued is not realistic since future standards must maximize technologically feasible and economically justified efficiency improvements. These commenters also argued that the assumption by AHRI that all future standards will have the same conversion costs as the first standard is similarly

unrealistic, because future increases to the furnace fan standards will not be as far-reaching as the initial standards. (Joint Commenters, No. 42 at p. 7)

Several commenters, including manufacturers, utilities, and efficiency organizations, did come together in support of aligning future rulemakings or compliance timelines (including AFUE, FER, and PW_{SB} and PW_{OFF} test procedures and standards) to reduce manufacturer burden. (Lennox, No. 34 at pp. 2, 5-6; Regal Beloit, No. 25 at p. 1; Joint Commenters, No. 42 at pp. 2, 7; CEC, No. 38 at p. 5; CA IOUs, No. 27 at pp. 8-9; Consumer Groups, No. 31 at p. 3; NEMA, No. 26 at p. 8; NEEA, No. 35 at p. 2) Lennox opined that EPCA (specifically, 42 U.S.C. 6295(m)(4)(B)) precludes DOE from imposing AFUE and FER standards in an uncoordinated manner within a six-year period. (Lennox, No. 34 at p. 6)

Several commenters stated that the AFUE2 metric was developed without significant or open stakeholder input and/or argued that further review would be required before it could be adopted. (NEEP, No. 36 at pp. 1-2; CT DEEP, No. 46 at pp. 1-2; NYSERDA, No. 30 at p. 2; National Grid, No. 28 at p. 1; Regal Beloit, No. 25 at p. 4) Along these lines, ASE suggested that a single metric is logical and intuitive for consumers and could be investigated in a future rulemaking to determine whether a single metric for furnaces is feasible, capable of facilitating increased efficiency, and in the best interests of homeowners and consumers. However, ASE also suggested that DOE should conduct a thorough analysis of the possibility of a new test procedure for the next energy conservation standard for furnaces to avoid the need for a crosswalk and prevent the possibility of backsliding. (ASE, No. 40 at p. 2) Similarly, NPCC supported the concept of a single metric because it could be a simpler metric for consumers, could reduce the number of test procedures and energy conservation standards rulemakings for DOE and industry, and could permit more flexible innovation by manufacturers. However, NPCC opposed the petition as written, asserting that the specific AFUE2 approach in the petition would likely reduce or eliminate the impact of the furnace fan standards. (NPCC, No. 29 at p. 2)

NRDC and the CA IOUs specifically opposed the AFUE2 test procedure's move to eliminate cyclic testing, asserting that this would remove the incentives for manufacturers to reduce cycling losses. (NRDC, No. 39 at pp. 6-7; CA IOUs, No. 27 at p. 9) NRDC also asserted that elimination of cyclic testing in the requested test procedure and its modification of the assumed operating hours that go into calculating AFUE are attempts to reopen issues that have already been publicly discussed and decided by DOE. (NRDC, No. 39 at pp. 6-7)

NEMA recommended that in any future standard based on AFUE2, DOE should require that the portion of the AFUE2 metric that accounts for furnace electrical consumption be as stringent or more stringent than the currently established FER standards. NEMA stated that this approach would require the differences in AHRI's proposed AFUE2 formula and DOE's FER formula (*e.g.*, use of different operating hours) to be reconciled. (NEMA, No. 26 at pp. 6-8)

A.O. Smith commented that the AFUE2 metric should not be applied to boilers based on the commenter's understanding of the scope of the petitioners' request and the product distinctions between a forced-air furnace and consumer boiler. A.O. Smith expressed concerns with several aspects of the AFUE2 metric including: (1) inclusion of source-based power generation differences between gas and electricity in the metric; (2) the technical feasibility of integrating standby mode and off mode consumption with fossil-fuel consumption for consumer boilers; and (3) the absence of an affirmative indicator of intent to include consumer boilers in the AFUE2 metric. (A.O. Smith, No. 44 at pp. 1-2)

As explained in the following section, DOE carefully considered the relevant comments received in evaluating whether to initiate a rulemaking to propose adoption of the AFUE2 metric as requested by AHRI in its petition for rulemaking. DOE's response to these comments and its decision on the AHRI Petition are discussed in the balance of this document.

IV. DOE Analysis and Discussion

DOE first considered whether EPCA provides authority to adopt a single metric for furnaces and furnace fans, as requested by AHRI in their Petition for Rulemaking. As discussed,

EPCA requires that any test procedures prescribed or amended must be reasonably designed to produce test results which measure energy efficiency or energy use of a covered product during a representative average use cycle or period of use, as determined by the Secretary, and shall not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3)) While the AHRI petition suggests that standards relying on AFUE2 could be established through a “crosswalk” as part of the test procedure rulemaking under 42 U.S.C. 6293(e), that provision does not affect the Secretary's obligation to issue final rules as described in 42 U.S.C. 6295. (42 U.S.C. 6293(e)(4)) Among the obligations under 42 U.S.C. 6295, EPCA requires that any new or amended energy conservation standard prescribed by the Secretary for any type (or class) of covered product must be designed to achieve the maximum improvement in energy efficiency, which the Secretary determines is technologically feasible and economically justified. (42 U.S.C. 6295(o)(2)(A)) DOE must also generally incorporate standby mode and off mode energy use into a single standard, or, if that is not feasible, adopt a separate standard for such energy use for that product. (42 U.S.C. 6295(gg)(3)(A)-(B)) Also as discussed, EPCA contains what is known as an “anti-backsliding” provision, which prevents the Secretary from prescribing any amended standard that either increases the maximum allowable energy use or decreases the minimum required energy efficiency of a covered product. (42 U.S.C. 6295(o)(1))

In the past, DOE has determined furnaces and furnace fans to be separate covered products, each subject to the relevant test procedure and energy conservation standard provisions under EPCA. 79 FR 38130, 38175 (July 3, 2014). EPCA explicitly includes furnaces in the list of covered products. (42 U.S.C. 6292(a)(5)) Subject to certain criteria and conditions, EPCA requires DOE to consider and establish energy conservation standards for “electricity used for purposes of circulating air through duct work” (which DOE has defined as residential “furnace fans” at 10 CFR 430.2)). (42 U.S.C. 6295(f)(4)(D)) Accordingly, DOE has established energy conservation standards at 10 CFR 430.32(y) for furnace fans as covered products through a final rule published in the *Federal Register* on July 3, 2014. 79 FR 38130. Separately, DOE has

established an energy conservation standard for furnaces governing the energy efficiency of active mode (10 CFR 430.32(e)(1)(ii)) and also established standards for furnace standby mode and off mode electrical power consumption (10 CFR 430.32(e)(1)(iii)).

DOE first evaluated whether it would be possible to establish a standard in terms of AFUE2 without increasing the maximum allowable energy use or decreasing the minimum required efficiency of furnaces (excluding during standby mode and off mode operation) and/or furnace fans (*i.e.*, whether a standard could be prescribed in terms of AFUE2 without violating EPCA's anti-backsliding provision).

A combined metric (*i.e.*, AFUE2) for furnaces and furnace fans would reflect the total energy consumption from both the furnace and furnace fan. In its petition, AHRI described the concept of the AFUE2 metric as follows: "The AFUE2 metric accounts for furnace fuel, fan power, and stand-by and off-mode power consumption. The measured value represents the sum of usable heat and fan benefit, divided by the total fuel and electricity consumed." (AHRI, No. 2 at p. 2) As a result of combining the various metrics into a single metric, manufacturers would be able to make tradeoffs between the efficiencies of the various covered products (*e.g.*, using a less-efficient fan while improving the efficiency of fuel consumption), which could lead to the efficiencies of either covered product (*i.e.*, either the furnace or furnace fan) decreasing below the currently applicable energy conservation standard.

As an example, if a single energy conservation standard were established for furnaces and furnace fans using the AFUE2 metric that is of equivalent stringency to the current minimum AFUE and maximum standby mode and off mode power consumption levels required for furnaces, and the maximum FER levels allowed for furnace fans, then a furnace paired with a highly efficient furnace fan could potentially have a fuel consumption efficiency (*i.e.*, AFUE) less than what is currently required under the AFUE standards (*e.g.*, less than 80 percent AFUE for non-weatherized gas furnaces), resulting in backsliding for the furnace efficiency as compared to the existing AFUE standard. Similarly, an AFUE2 standard could be met by

pairing a furnace with a high AFUE (*e.g.*, over 90 percent) with an inefficient furnace fan that that would not separately meet the existing FER requirement. Furnaces with high AFUE ratings could also potentially meet AFUE2 standards despite having standby mode and/or off mode power consumption that are not compliant with current requirements.

The CA IOUs provided test data for two units tested to the AFUE, FER, and AFUE2 test procedures that illustrated the risk of backsliding. The two units tested were both non-weatherized gas furnaces, and both had 80-percent AFUE ratings, input capacities of 60,000 Btu/h, and maximum blower rated airflows of 1,200 CFM. One unit (referred to as unit under test (“UUT”)-01) had a permanent split capacitor blower motor and an FER rating of 359 Watts per 1,000 cfm (which is non-compliant with the existing standard for furnace fans at 10 CFR 430.32(y)). The other unit (UUT-02) had a blower with a multi-speed electrically commutated motor and an FER rating of 233 Watts per 1,000 cfm (which is compliant with the existing standard for furnace fans at 10 CFR 430.32(y)). Despite the significant differences in fan motor efficiencies, the AFUE2 ratings were only 1.3 percent different.⁹ (CA IOUs, No. 27 at pp. 1-3) These test results illustrate how efficiency improvements associated with a high-fuel-efficiency furnace could offset efficiency decreases from using a low-efficiency furnace fan at a given AFUE2 rating (*i.e.*, illustrating how under a unified metric, implementing a high-efficiency furnace technology could enable backsliding of furnace fan energy efficiency). Thus, if DOE were to adjust its existing furnaces energy conservation standards to now also capture fan energy use, it would only impact minimally compliant products and arguably grant an improper reprieve to products at the higher end of the efficiency marketplace. Additionally, as was also discussed by the CA IOUs, the data provided by AHRI in its AFUE2 Petition Exhibit 2 (Example Calculations)¹⁰ suggests that units with a wide range of FER ratings (including those that are

⁹ The CA IOUs did not measure jacket losses during testing and used the default value of 1 percent, as is allowed by the furnace test procedure at Appendix N if a jacket loss test is not conducted. The CA IOUs also estimated the AFUE2 results with a jacket loss factor of 0.3 percent, and the difference in ratings between UUT-01 and UUT-02 in that case was 1.2 percent.

¹⁰ The original data provided by AHRI can be found at www.regulations.gov/document/EERE-2018-BT-PET-0017-0002 as Exhibit 2.

compliant with the current FER requirements and those that are not) can have the same AFUE2 ratings. (CA IOUs, No. 27 at pp. 3-4) As a result of these findings, DOE has determined that adopting a single AFUE2 metric would violate EPCA's anti-backsliding provisions because it would allow decreases in the energy efficiency of individual covered products.

In evaluating the AHRI petition, DOE also separately sought to determine whether it would be feasible to integrate the active mode energy use and standby mode and off mode power consumption into an integrated metric. DOE has previously determined in a final rule published in the *Federal Register* that it is not feasible to establish an energy conservation standard for furnaces that integrates electrical standby mode and off mode energy use. 75 FR 64621, 64623 (Oct. 20, 2010; "October 2010 final rule"). In the October 2010 final rule, DOE concluded that it would not be technically feasible to develop an integrated metric combining electrical standby mode and off mode energy consumption into the calculation of overall annual energy consumption of those products because the standby mode and off mode energy usage, when measured, is essentially lost in practical terms due to the fact that manufacturers' ratings of AFUE are presented to the nearest whole number. *Id.* Although furnace ratings are now reported to the tenth place for compliance certification purposes (*see* 10 CFR 429.18(a)(2)(vii)), standby mode and off mode power consumption is substantially less than active mode power consumption and may not be apparent in the measured energy use of a furnace, and it does not change the fact that DOE's furnace energy conservation standards using the AFUE metric continue to be set at the nearest whole number. As such, a combined metric would likely not provide consumers any meaningful information as to the standby mode and off mode energy use of a furnace and may disincentivize manufacturers from making improvements to standby mode and off mode furnace efficiency.

DOE estimates that the electrical standby mode and off mode power consumption typically make up less than one percent of the combined furnace and furnace fan energy consumption, meaning that small increases in standby mode and off mode consumption would

have little bearing on the AFUE2 rating. In its review of data provided by AHRI as part of its petition, DOE noted that a hypothetical doubling of the standby mode power consumption would result in a change of the AFUE2 result of less than half of one percent for each unit in the dataset. The AHRI petition and accompanying data do not support DOE changing its prior determination that it is not technically feasible to combine standby and off mode power consumption into a combined metric, and therefore, the Department continues to conclude that these standards should remain separate.

As discussed previously, NEMA suggested that to prevent backsliding, in conjunction with a combined metric, DOE could create a separate requirement for the efficiency of the electrical component. (NEMA, No. 26 at pp. 6-8) For example, under such an approach, DOE would establish a combined metric (*e.g.*, AFUE2) but would additionally require that the furnace fan maintain a level of efficiency (*e.g.* FER) no lower than the currently established FER standard. However, this approach was not suggested in the AHRI Petition, and DOE is not considering a modified combined metric, because with certain limited exceptions, DOE has interpreted the statutory definition of “energy conservation standard” at 42 U.S.C. 6291(6) and 42 U.S.C. 6311(18) as permitting establishment of only a single performance standard.¹¹ Furthermore, DOE notes that it is not clear that this suggested alternate approach would reduce the regulatory burden on manufacturers because a combined metric would have to include separate measurements and calculations for fuel consumption efficiency (to be compared to current AFUE standards), standby mode and off mode power consumption (to be compared to

¹¹ DOE notes that it has adopted dual metrics under 42 U.S.C. 6313(a)(6)(A), when the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) has amended ASHRAE Standard 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings*, and set a dual metric and accompanying standard levels. *See, e.g.*, 77 FR 28928 (May 16, 2012) (DOE adopted energy conservation standards for cooling and heating modes in terms of both Energy Efficiency Ratio (EER) and Coefficient of Performance (COP) for variable refrigerant flow (VRF) water-source heat pumps with cooling capacities at or greater than 135,000 Btu/h and less than 760,000 Btu/h (for which DOE did not previously have standards) in response to updated standards for such equipment in ASHRAE Standard 90.1.) DOE has also adopted a dual metric where a consensus agreement has been presented to DOE for adoption as a direct final rule (DFR) pursuant to 42 U.S.C. 6295(p)(4). *See, e.g.*, 76 FR 37408 (June 27, 2011) (For central air conditioners, DOE adopted dual metrics (*i.e.*, the Seasonal Energy Efficiency Ratio (SEER) and EER) for the hot-dry region as recommended by a consensus agreement supported by a variety of interested stakeholders including manufacturers and environmental and efficiency advocates.) DOE has interpreted these specific statutory provisions as authorizing an exception to the general rule previously stated.

current $P_{W,SB}$ and $P_{W,OFF}$ standards), and furnace fan efficiency (to be compared to current FER standards) in order to prevent backsliding vis-a-vis any of the current metrics. Therefore, such an approach would effectively add an extra metric (*e.g.*, AFUE2) without replacing any of the current metrics in practical terms.

Because DOE has determined that the proposed AFUE2 combined metric for furnaces and furnace fans would not be permitted under EPCA, DOE considers other comments received regarding the AHRI Petition, and in particular whether DOE should propose to adopt the AFUE2 metric, to be resolved. With regard to comments suggesting that DOE should align its future rulemakings for furnaces and furnace fans to minimize regulatory burden on manufacturers, DOE notes that it is bound by the statutory timeline provisions set out in EPCA. In particular, EPCA provides that, not later than 6 years after the issuance of any final rule establishing or amending a standard, DOE must publish either a notice of determination that standards for the product do not need to be amended, or a NOPR including new proposed energy conservation standards (proceeding to a final rule, as appropriate). (42 U.S.C. 6295(m)(1)) EPCA also requires that, at least once every 7 years, DOE evaluate test procedures for each type of covered product, including furnaces and furnace fans, to determine whether amended test procedures would more accurately or fully comply with the requirements for the test procedures to not be unduly burdensome to conduct and be reasonably designed to produce test results that reflect energy efficiency, energy use, and estimated operating costs during a representative average use cycle or period of use. (42 U.S.C. 6293(b)(1)(A)) To the extent feasible, DOE will seek to align the statutory review schedules for furnaces and furnace fans consistent with the provisions EPCA.

V. Denial of Petition

Taking into account all of the factors discussed above and consistent with the requirements under EPCA, DOE is hereby denying AHRI's petition for rulemaking.

VI. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this final denial of petition for rulemaking.

Signing Authority

This document of the Department of Energy was signed on September 9, 2021, by Kelly Speakes-Backman, Principal Deputy Assistant Secretary and Acting Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the *Federal Register*.

Signed in Washington, DC, on September 9, 2021.

Treena V. Garrett
Federal Register Liaison Officer,
U.S. Department of Energy